

SHEAR BOND STRENGTH OF AN EXPERIMENTAL CERAMIC REPAIR SYSTEM

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ABSTRACT

The objective of the present study was to determine the shear bond strength to zirconium oxide ceramic of two ceramic repair systems (one experimental and one commercial) and to determine the influence of the surface preparation methods (Sandblast and Bur) on the shear bond strength of each repair system. M&M: Zirkonzahn disk (9 mm diameter, 4 mm height) were divided into sandblasted (110 µm alumina particles for 10 sec, 2,5 bar), and abraded with a green stone-like bur. The specimens in the four groups (n=10) were shear bond strength tested. Data (Mean MPa) were analysed with two-way ANOVA and independent T tests were performed to evaluate differences between materials within each surface treatment and to evaluate the differences between group of the manufacturer's indications, i.e. CRS with the Bur and CR with the sandblast. 3 samples per group were performed to analyse the interface under a Scanning Electron Microscope. Results: There was an interaction between Material and Surface treatment ($p < 0,05$). A significant difference was detected between groups that were sandblasted ($p < 0,05$), (CR sandblasted = 12,69 ± 6,07 MPa, CRS sandblasted = 4,44 ± 2,32 MPa) but the bur groups were not statistically different ($p > 0,05$) (CR Bur = 9,2 ± 5,31 MPa, CRS Bur = 8,8 ± 3,55 MPa) also the manufacturer's instruction groups were not statistically different ($p > 0,05$). Conclusions: According to the results of this in vitro study, abrasion treatment of the ceramic surface for repairing should be performed according to the manufacturer's instructions of the repair system. sofiaaol@fmd.ul.pt

PURPOSE

The adhesion resistance of two ceramic repair systems (one experimental and one commercial) was tested. The influence of the ceramic surface preparation methods (Sandblast and Bur), on the shear bond strength of each repair system was tested.

MATERIALS AND METHODS

Zirkonzahn disk (9 mm diameter, 4 mm height) were divided into sandblasted (110 µm alumina particles for 10 sec, 2,5 bar), and abraded with a green stone-like bur.

10 samples were used per group

Ceramic disks were held in plate A of the Watanabe single-plane lap shear device with dye stone.

A deshesion area was standardized in 3mm diameter and repair systems were applied according to the instructions into the plate B.

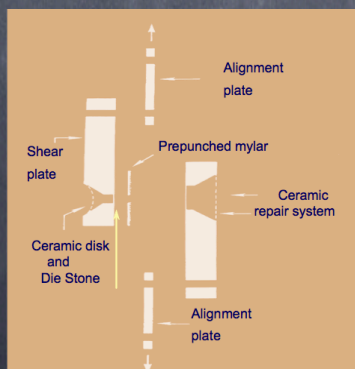


Figure 1- Diagram of the Watanabe single plate lap shear device

MATERIALS AND METHODS

Groups and experimental sequence

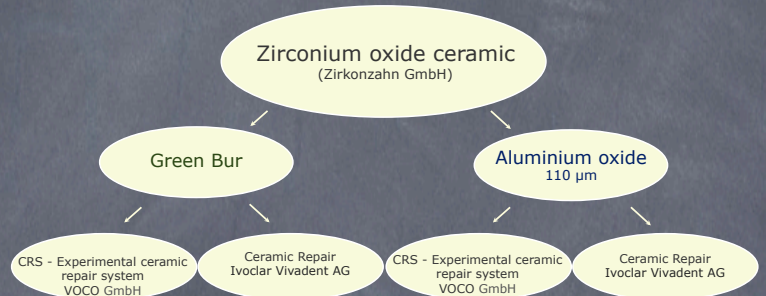
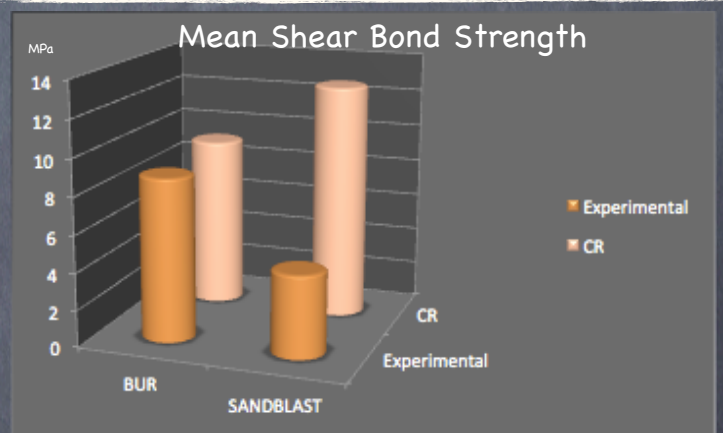


Figure 2- Experimental sequence- The surface of the ceramic disks was prepared with either a green stone like bur or the aluminium oxide sandblast (110 µm for 10 sec). And each 10 specimens were bond strength tested with one of the ceramic repair system (Experimental- Ceramic repair- VOCO ; CR- Ceramic repair IVAG)

After bonding procedures samples were thermalcycled with 500 cycles in 55°C and 5°C with a dwell time of 20 sec

Data (Mean MPa) were analysed with two-way ANOVA and independent T tests were performed to evaluate differences between materials within each surface treatment and to evaluate the differences between group of the manufacturer's indications

RESULTS



Graph 1- Mean Shear bond strength of the ceramic repair systems (Experimental- Ceramic repair- VOCO ; CR- Ceramic repair IVAG) to zirconium oxide ceramic with two different surface treatments (Bur- Green stone like bur; Sandblast- 110 µm Aluminium oxide abraded)

There was an interaction between Material and Surface treatment ($p < 0,05$).

A significant difference was detected between groups that were sandblasted ($p < 0,05$), (CR sandblasted = 12,69 ± 6,07 MPa, EXP sandblasted = 4,44 ± 2,32 MPa)

The manufacturer's instruction groups and bur groups were not statistically different ($p > 0,05$).

CONCLUSIONS

According to the results of this in vitro study, abrasion treatment of the ceramic surface for repairing should be performed according to the manufacturer's instructions of the repair system.

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